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CHARACTERIZATION TEST PROGRAM Final Report
(DCA Reliability Labs., Sunnyvale, Calif.)
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JAN TRANSISTOR AND DIODE CHARACTERIZATION TEST PROGRAM

FINAL REPORT
FOR
JANTX DIODE
1N5554

MARCH 1977
Prepared
for

GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Marshall Space Flight Center, Alabama 35812

MSFC/NASA CONTRACT No. NAS6-31944

by
HIRO TAKEDA

DCA RELIABILITY LABORATORY
SPECIAL PRODUCTS DIVISION
975 BENICIA AVE.
SUNNYVALE, CALIFORNIA 94086



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DCA RELIABILITY LABORATORY

FORWARD

This report is a statistical summary of the electrical characterization performed on NASA Contract NA8-31944. This is one of a group of thirty-nine (39) such reports prepared on selected JAN and JANTX Transistors and Diodes for the George C. Marshall Space Flight Center, Huntsville, Alabama. The Contracting Officer's Technical Representative was Mr. Howard B. Meeks.

This work was performed by DCA Reliability Laboratory, Special Products Division, Sunnyvale, California under the management of Mr. Robert Starr with the special assistance of Mr. Barry Lorenzo, Mr. Kenneth Radford and Mr. Hiroharu Takeda.

CONTENTS

1.0	INTRODUCTION	1-1
1.1	Sample Selection	1-1
1.2	Procurement Guidelines	1-1
2.0	TECHNICAL SUMMARY	2-1
2.1	TEST PARAMETERS AND CONDITIONS	2-1
2.1.1	Reverse Current (I_R)	2-1
2.1.3	Breakdown Voltage (B_V)	2-1
2.1.4	Forward Current (V_F)	2-1
2.1.7	Thermal Resistance, test in DEG/W (θ_{J-C})	2-1
2.2	UNIT DEFINITIONS	2-2
3.0	STATISTICAL SUMMARY	3-1
4.0	HISTOGRAM DATA	4-1
4.1	I_R	4-2
4.2	I_{R2}	4-9
4.3	B_V	4-13
4.4	V_{F1}	4-17
4.5	V_{F2}	4-24
4.6	V_{F3}	4-31
4.7	θ_{J-C}	4-38

CONTENTS (CONTINUED)

- 5.0 NUMERICAL DATA $T_A = 25^{\circ}\text{C}$
(Book 2 EC 43 & EG 02 MSFC only) 5-1
- 6.0 NUMERICAL DATA $T_A = +150^{\circ}\text{C}$
(Book 2 EC 43 & EG 02 MSFC only) 6-1
- 7.0 NUMERICAL DATA $T_A = -65^{\circ}\text{C}$
(Book 2 EC 43 & EG 02 MSFC only) 7-1

LIST OF ILLUSTRATIONS

FIGURE

2-1	Internal Construction Semtech	2-3
2-2	Internal Construction Semtech	2-3
2-3	Internal Construction Micro Semiconductor	2-4

1.0 INTRODUCTION

The objective of this characterization program is to provide the necessary data to create a new class of 19500 detail specifications "JAN A CLASS".

1.1 SAMPLE SELECTION

Sample selection was made according to the following criteria:

1. Manufacturer or qualified distributor.
2. Two vendors.
3. Two date codes.

1.2 PROCUREMENT GUIDELINES

The general guidelines for procurement were:

1. Two QPL vendors
2. JAN or JANTX
3. Two (2) manufacturing lots (Date Codes), twenty-seven (27) from each lot.

2.0 TECHNICAL SUMMARY

The devices used in this report were JANTX 1N5554 Silicon Diodes manufactured by Micro Semiconductor and Semtech.

All data was acquired with three (3) digit accuracy. The data processing and calculation of statistical parameters was performed by the Tektronix S-3260 computer system using four (4) digit display.

2.1 TEST PARAMETERS AND CONDITIONS

- 2.1.1 I_R $V_R = 1000V$ (Max. Rated V_R) $T_A = 25^{\circ}C$ & $150^{\circ}C$
- 2.1.2 I_{R2} $V_R = 1000V$ (Max. Rated V_R) $T_A = 25^{\circ}C$
Reverse Current, applied after stress test of $I_{fsm} = 30A$ (PK) 10 surges of 8.3MS each at 1-minute interval.
- 2.1.3 B_V $I_R = 50.0mA$ $T_A = 25^{\circ}C$
- 2.1.4 V_{F1} $I_F = 0.9A$ (10% of Rated I_F) $T_A = 25^{\circ}C$ & $-65^{\circ}C$
- 2.1.5 V_{F2} $I_F = 4.5A$ (50% of Rated I_F) $T_A = 25^{\circ}C$ & $-65^{\circ}C$
- 2.1.6 V_{F3} $I_F = 9.0A$ (100% of Rated I_F) $T_A = 25^{\circ}C$ & $-65^{\circ}C$
- 2.1.7 θ_{J-C} $T_A = 100^{\circ}C$

2.2 UNIT DEFINITIONS

NAME	SYMBOL	MULTIPLIER
Kilo	K	10^3
Milli	M	10^{-3}
Micro	U	10^{-6}
Nano	N	10^{-9}
Pico	P	10^{-12}

Example using a statistical summary section:

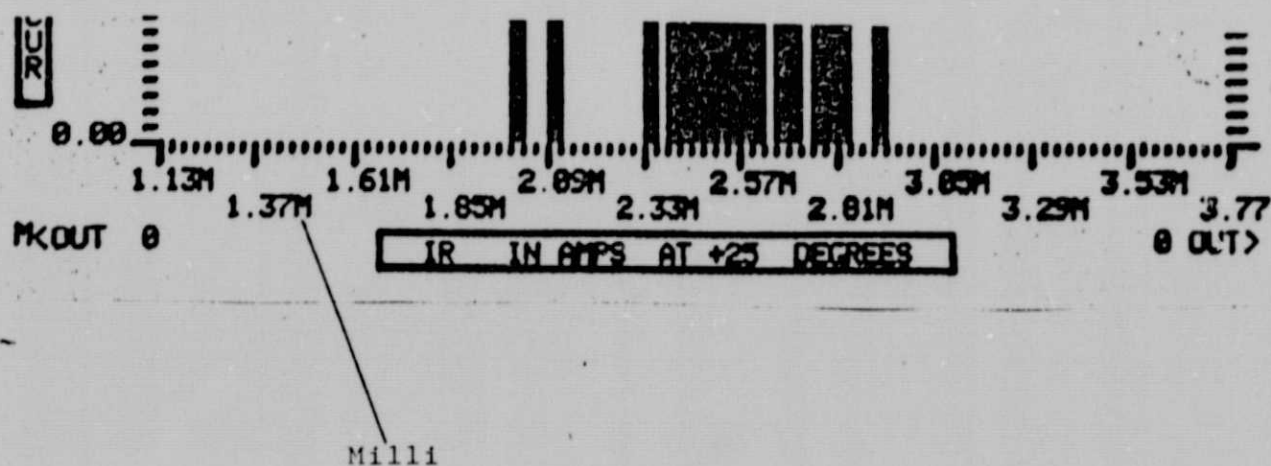
IR IN AMPS AT 25 DEGREES
AT VP=2.64 VOLTS

!MOTO/ 7603!	2.534M	218.7U	2.010M	2.090M	2.780M
!MOTO/ 7550!	2.423M	276.9U	2.010M	2.030M	2.780M
!SIEM/ 7508!	2.997M	426.5U	1.820M	2.490M	3.460M

Milli

Micro

Example using a histogram:



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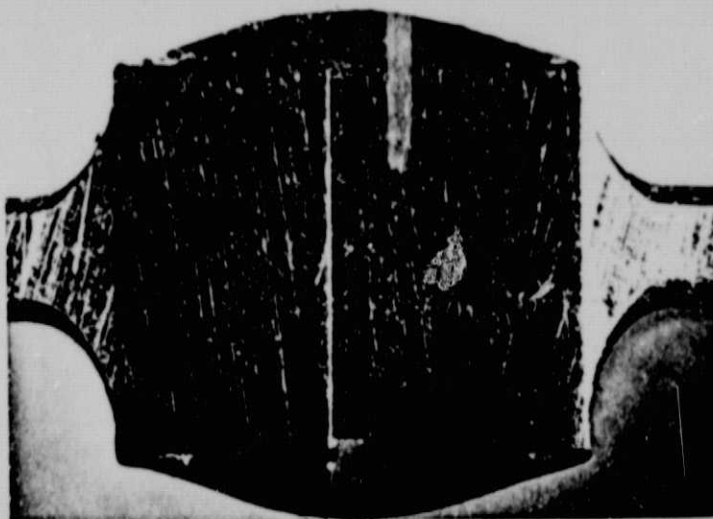


FIGURE 1

Device Number E026817
20 Diameters

D/C 7546
Mfg: Semtech

Typical Overall Cross-sectional
View

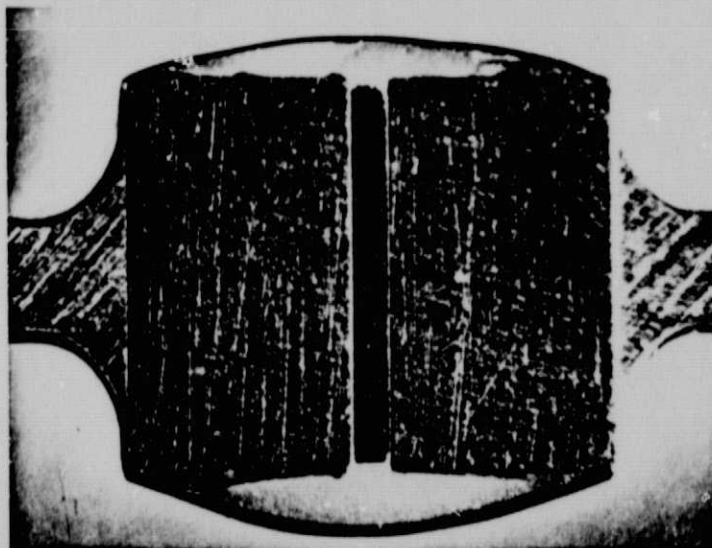


FIGURE 2

Device Number E026898
20 Diameters

D/C 7635
Mfg: Semtech

Typical Overall Cross-sectional
View

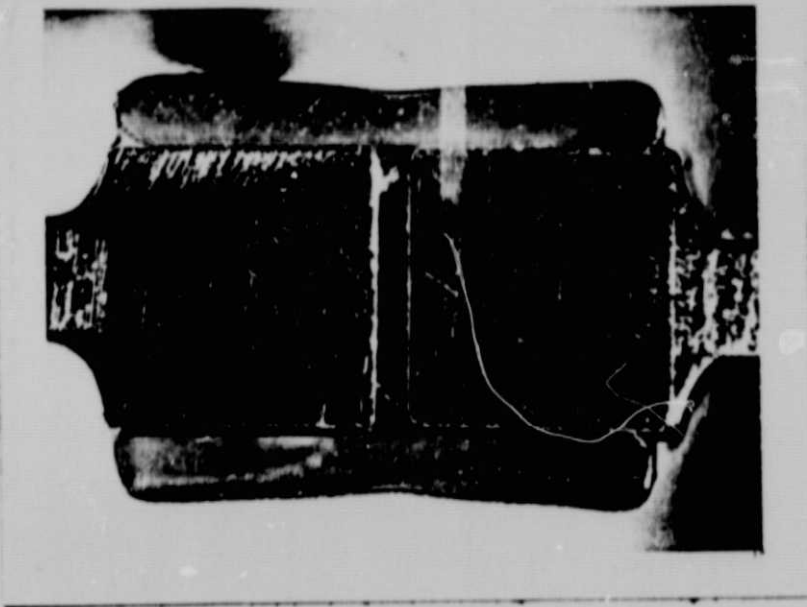


FIGURE 3

Device Number E026845
20 Diameters

D/C 7633
Mfg: MSC

Typical Overall Cross-sectional
View

3.0 STATISTICAL SUMMARY

The Statistical Summary, pages 3-2 to 3-4, are a consolidated presentation of the data acquired formatted for easy Vendor to Vendor and date code to date code analysis. Each parameter is presented with Test Conditions, Mean, Standard Deviation, Lowest Reading, 10% Point (where 10% of all readings are equal to or less than the indicated reading), 90% Point (where 90% of all readings are equal to or less than the indicated reading) and the Highest Reading.

It should be noted the Mean presented in the summary may vary slightly from that presented on the Histograms due to a slight variation in the data base used for calculation.

EXAMPLE:

MICRO SEMICONDUCTOR: I_R $V_R = 1000V$ $T_A = 25^{\circ}C$

Summary: MEAN 55.34N

Histogram: MEAN 54.59N

DCA RELIABILITY LABORATORY

PART NUMBER : IN5554

VENDOR : MICRO SEMICON

DATE CODE : 7633

VENDOR : SEMTECH

DATE CODE : 7546

VENDOR : SEMTECH

DATE CODE : 7635

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

IR IN AMPS AT 25 DEGREES
AT VR=1000 VOLTS

MSI / 7633	55.34N	42.98N	25.80N	29.30N	73.50N	313.0N
SEMT/ 7546	125.7N	89.93N	5.500N	18.00N	198.0N	413.0N
SEMT/ 7635	240.0N	128.4N	99.90N	119.0N	350.0N	550.0N

IR IN AMPS AT 150 DEGREES
AT VR=1000 VOLTS

MSI / 7633	21.32U	9.137U	7.270U	8.990U	30.00U	47.60U
SEMT/ 7546	107.3U	29.78U	53.30U	55.10U	130.0U	176.0U
SEMT/ 7635	119.3U	21.27U	79.90U	88.70U	142.0U	187.0U

IR2 IN AMPS AT 25 DEGREES
AT VR=1000 VOLTS (POST BV)

MSI / 7633	192.2U	1.372M	560.0P	22.60N	58.40N	245.0N
SEMT/ 7546	108.9N	52.36N	390.0P	30.70N	147.0N	238.0N
SEMT/ 7635	225.5N	111.3N	76.90N	99.90N	276.0N	492.0N

PART NUMBER 1105554

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

BV IN VOLTS AT 25 DEGREES
AT IR=50.0 UA

MSI / 7633	1.220K	43.69	1.112K	1.176K	1.276K	1.310K
SEMT/ 7546	1.242K	39.59	1.180K	1.192K	1.292K	1.340K
SEMT/ 7635	1.278K	83.63	1.172K	1.188K	1.379K	1.438K

VF1 IN VOLTS AT 25 DEGREES
AT IF=0.9 AMPS

MSI / 7633	627.2M	59.88M	504.0M	539.0M	684.0M	811.0M
SEMT/ 7546	663.9M	119.6M	285.0M	473.0M	795.0M	877.0M
SEMT/ 7635	618.5M	126.9M	223.0M	395.0M	760.0M	792.0M

VF1 IN VOLTS AT -65 DEGREES
AT IF=0.9 AMPS

MSI / 7633	955.7M	7.525M	942.0M	946.0M	965.0M	978.0M
SEMT/ 7546	947.2M	8.786M	930.0M	931.0M	961.0M	966.0M
SEMT/ 7635	944.7M	8.268M	927.0M	934.0M	953.0M	964.0M

VF2 IN VOLTS AT 25 DEGREES
AT IF=4.5 AMPS

MSI / 7633	822.0M	45.73M	704.0M	744.0M	868.0M	918.0M
SEMT/ 7546	849.6M	112.6M	391.0M	694.0M	930.0M	999.0M
SEMT/ 7635	862.0M	85.35M	640.0M	651.0M	930.0M	981.0M

DCA RELIABILITY LABORATORY

PART NUMBER : 1N5554

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VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
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VF2 IN VOLTS AT -65 DEGREES
AT IF=4.5 AMPS

MSI / 7633	1.088	26.86M	1.040	1.050	1.120	1.160
SEMT/ 7546	1.118	28.14M	1.040	1.090	1.140	1.190
SEMT/ 7635	1.116	36.55M	1.060	1.060	1.170	1.180

VF3 IN VOLTS AT 25 DEGREES
AT IF=9.0 AMPS

MSI / 7633	916.9M	44.88M	825.0M	848.0M	963.0M	1.060
SEMT/ 7546	980.9M	120.9M	557.0M	753.0M	1.080	1.180
SEMT/ 7635	1.019	97.12M	795.0M	831.0M	1.100	1.160

VF3 IN VOLTS AT -65 DEGREES
AT IF=9.0 AMPS

MSI / 7633	1.189	29.03M	1.130	1.160	1.220	1.270
SEMT/ 7546	1.257	47.96M	1.210	1.210	1.330	1.360
SEMT/ 7635	1.278	54.43M	1.200	1.210	1.350	1.400

O -J-C IN DEG/W AT 100 DEGREES
(JUNCTION TO CASE)

MSI / 7633	8.296	395.1M	7.467	7.769	8.774	9.307
SEMT/ 7546	6.541	882.2M	4.629	5.179	7.417	8.325
SEMT/ 7635	7.230	473.0M	6.316	6.490	7.670	8.199